A Proposed Strategy for Ensuring that Research is Responsive to the Knowledge Needs of the Eastern Scotian Shelf Integrated Management (ESSIM) Initiative

A Discussion Paper

R.D. Walmsley

Oceans and Coastal Management Division
Oceans and Habitat Branch
Fisheries and Oceans Canada
Maritimes Region
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, Nova Scotia B2Y 4A2

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A PROPOSED STRATEGY FOR ENSURING THAT RESEARCH IS RESPONSIVE TO THE KNOWLEDGE NEEDS OF THE EASTERN SCOTIAN SHELF INTEGRATED MANAGEMENT (ESSIM) INITIATIVE—A DISCUSSION PAPER

Prepared by:
R.D. Walmsley
Oceans and Coastal Management Division
Oceans and Habitat Branch
Fisheries and Oceans Canada
Maritimes Region
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, Nova Scotia B2Y 4A2

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Persons Consulted	Affiliation
Arbour, Joe	Department of Fisheries and Oceans
Boudreau, Paul	Department of Fisheries and Oceans
Bundy, Alida	Department of Fisheries and Oceans
Butler, Mike	International Ocean Institute / ACZISC
Butler, Mark	Ecology Action Centre
Cameron, Bruce	Nova Scotia Department of Energy
Charles, John	Halifax Regional Municipality
Claytor, Ross	Department of Fisheries and Oceans
Coffen-Smout, Scott	Department of Fisheries and Oceans
Cohen, Fay	Dalhousie University
Dale, Carla	Department of Fisheries and Oceans
Davies, Michael	Nova Scotia Department of Economic Development
Hall, Tim	Department of Fisheries and Oceans
Herbert, Glen	Department of Fisheries and Oceans
Hildebrand, Larry	Environment Canada
King, Marty	World Wildlife Fund
Lane, Dan	Ocean Management Research Network
Lee, Kenneth	Department of Fisheries and Oceans
MacKenzie, Debbie	Grey Seal Conservation Society
MacNeil, Kim	Nova Scotia Department of Environment and labour
Millar, Dave	Department of Fisheries and Oceans
Mohn, Robert	Department of Fisheries and Oceans
Morrison, Craig	Nova Scotia Department of Environment and labour
O'Boyle, Bob	Department of Fisheries and Oceans
Parker, Andy	Canada-Nova Scotia Offshore Petroleum Board
Richardson, Dave	St Mary's University
Rose, Carol Ann	Department of Fisheries and Oceans
Sephton, Tom	Department of Fisheries and Oceans
Sinclair, Mike	Department of Fisheries and Oceans
Smith, Bruce	BLSmith Groupwork Inc.
Smith, Jennifer	World Wildlife Fund
Smith, Peter	Department of Fisheries and Oceans
Stirling, Roger	Seafood Processors Association of Nova Scotia
Surette, Tim	Department of Fisheries and Oceans
Traversy, Karen	Nova Scotia Coastal Coalition
Walmsley, Jay	Jacques Whitford Inc.
Weseloh McKeane, Jennifer	Tourism Industry of Nova Scotia
Weseloh McKeane, Sean	Nova Scotia Department of Fisheries and Aquaculture
Willison, Martin	Dalhousie University (OMRN)
Zwanenberg, Kees	Department of Fisheries and Oceans

EXECUTIVE SUMMARY

The objective of this document is to propose an overall strategic approach to the ESSIM Plan objective of ***ensuring that natural and social science research is responsive to the knowledge needs of ESSIM stakeholders***. The intention is that it should serve as further extension of one of the many implementation components of the Plan. It provides perspectives and suggestions that will require further debate and discussion by ESSIM stakeholders and, once agreement has been reached concerning which elements of the proposed strategy should be pursued, the next step will be to develop an action plan for their implementation.

The process in developing this proposed strategy has involved:

- Consultation with a variety of parties and stakeholders who form part of the wider ESSIM network (see list of persons in acknowledgements);

- Consideration of knowledge needs for the ESSIM Plan, as defined by key stakeholder questions (see Annex 1);

- Examination of ESSIM's current research capabilities and potential to respond to meeting these knowledge needs (Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis in section 4); and

- Development of suggested outcomes statements for the objective with a proposed strategy to meet these (see section 5).

The knowledge needs of ESSIM are enormous and, currently, the ESSIM system does not have the capacity to respond to all of them. There are many factors which make this so – mostly related to stakeholder attitudes and the organizational system for supporting oceans research in Canada. There are however numerous strengths within the ESSIM stakeholder community, and opportunities that, if capitalized on, can be used to create a valuable and responsive research system.

Bearing this in mind the following statements are suggested as best reflecting the operational outcomes for this ESSIM objective:

- ESSIM knowledge needs are continually being identified and formally announced;
- An interactive interdisciplinary network of research and monitoring personnel is in place;
- Adequate operational research resources (finances, personnel and institutions) have been mobilized;
- Information on research is readily available and effectively communicated; and
- An ESSIM research management and coordination system is in place.

To achieve these outcomes, a strategy, with associated activities, is proposed which covers seven main areas, notably:

1. **Providing direction to researchers**, through the definition of operational outcomes for each objective, identification of knowledge gaps, prioritization of needs, and announcement of opportunities;

2. **Mobilizing the research force** by establishing an interdisciplinary and interactive network of working groups with an appropriate level of organization and coordination;

3. **Elevating the funding** by increasing the general prominence of ESSIM within funding institutions, establishing an ESSIM research fund, and securing support from all possible stakeholders through partnerships and joint ventures;

4. **Increasing awareness of ESSIM** research and knowledge needs through a variety of activities such as conferences, workshops, promotional material, publications, internet and other media etc.;

5. **Linking managers and researchers** through continuous interaction in the development and evaluation of outcomes, as quantitatively and qualitatively monitored and reported on through research processes. This activity should act as one of the main mechanisms of researcher involvement in ESSIM;

6. **Developing and increasing the intellectual capacity** of all ESSIM stakeholders through the development and implementation of a wide range of training and educational activities that transfers research knowledge to all sectors and personnel levels; and

7. **Upgrading research governance and leadership** by creating an organizational system that includes, amongst others: an ESSIM research working group with chairperson reporting to SAC, research leaders for ESSIM objectives, and a general ESSIM research coordinator.

This proposed strategy does not deal with what, or how, specific research should be done, but focuses on how research should be organized by ESSIM in order to be responsive. The issue of what specific research activities should be carried out is one that should form part of each strategy that is developed for the other 29 ESSIM objectives.

It is recommended that ESSIM stakeholders discuss and debate the rationale and ideas presented in this document as there is a need to secure collective agreement on what elements of the proposed strategy should be pursued. This could possibly be achieved by convening a focused stakeholder workshop which, using this document as starter material, has the purpose of further developing outcomes, strategy and actions for this ESSIM objective. Success in achieving the objective will depend entirely on the resources that are able to be allocated to each of the proposed seven areas and their activities. The workshop could also attempt to identify where, and how, such resources can be mobilized.

RÉSUMÉ

Le présent document a pour but de proposer une stratégie générale pour la réalisation de l'objectif du Plan de GIEPNE ***visant à faire en sorte que la recherche en sciences naturelles et sociales réponde aux besoins des intervenants de la GIEPNE en matière de connaissances***. Il est à considérer comme un prolongement d'un des nombreux volets que comporte la mise en oeuvre du plan. Il offre des perspectives et suggestions qui devront faire l'objet de plus amples débats et discussions de la part des intervenants de la GIEPNE. Une fois qu'on aura convenu des éléments à retenir dans cette proposition de stratégie, il faudra élaborer un plan d'action pour leur mise en œuvre.

Le processus d'élaboration de la stratégie proposée a comporté les étapes suivantes :

- la consultation des parties et intervenants divers qui constituent le grand réseau de la GIEPNE (voir la liste des personnes dans les Remerciements);

- la prise en considération des besoins de connaissances connexes au Plan de GIEPNE, définis d'après des questions aux principaux intervenants (annexe 1);

- l'examen des capacités actuelles de recherche dans le cadre de la GIEPNE et des possibilités de répondre à ces besoins de connaissances (analyse des forces, faiblesses, possibilités et menaces [FFPM] à la partie 4);

- l'élaboration d'énoncés de résultats suggérés associés à l'objectif et d'une proposition de stratégie en vue d'obtenir ces résultats (voir la partie 5).

Les besoins de connaissances liés à la GIEPNE sont énormes et, à l'heure actuelle, le système de GIEPNE n'est pas en mesure de les satisfaire en totalité. Cela est dû à de nombreux facteurs, qui ont trait principalement aux attitudes des intervenants et au système organisationnel d'appui à la recherche dans le domaine des océans au Canada. Toutefois, il y aussi chez les intervenants de nombreux atouts et possibilités dont on peut tirer parti pour créer un système de recherche utile et adapté.

Compte tenu de ces facteurs, on considère que les énoncés suivants sont ceux qui reflètent le mieux possible les résultats opérationnels associés à cet objectif de la GIEPNE :

- Les besoins de connaissances connexes à la GIEPNE sont continuellement cernés et il en est fait état en bonne et due forme;
- Un réseau interactif interdisciplinaire de personnel oeuvrant à la recherche et à la surveillance est en place;
- Des ressources opérationnelles adéquates en matière de recherche (finances, personnel et institutions) ont été mobilisées;
- L'information sur la recherche est facilement et rapidement disponible et elle bien communiquée;
- Un système de gestion et de coordination de la recherche associée à la GIEPNE est en place.

Pour atteindre ces résultats, on propose d'adopter une stratégie – et des activités connexes – comportant sept grands volets, soit :

1. **Orienter les chercheurs**, en définissant les résultats opérationnels connexes à chaque objectif, en cernant les lacunes dans les connaissances, en priorisant les besoins et en faisant connaître les possibilités.

2. **Mobiliser le secteur de la recherche** en créant un réseau interdisciplinaire et interactif de groupes de travail avec un degré pertinent d'organisation et de coordination.

3. **Accroître le financement** en ménageant une place plus grande à la GIEPNE au sein des institutions de financement, en créant un fonds de recherche de la GIEPNE et en obtenant l'appui de tous les intervenants possibles grâce à des partenariats et des coentreprises.

4. **Mieux faire connaître les besoins en matière de recherche et de connaissances liées à la GIEPNE** grâce à diverses activités comme les conférences, les ateliers, le matériel publicitaire, les publications, Internet et d'autres moyens.

5. **Établir un lien entre les gestionnaires et les chercheurs** grâce à une interaction continuelle dans l'élaboration et l'évaluation des résultats, qui feront l'objet d'une surveillance qualitative et quantitative et dont il sera rendu compte tout au long des processus de recherche. Cela devrait être un des principaux mécanismes de participation des chercheurs à la GIEPNE.

6. **Élaborer et accroître la capacité intellectuelle** de tous les intervenants de la GIEPNE grâce à la conception et à la mise en œuvre d'un grand éventail d'activités de formation et d'éducation, propices au transfert des connaissances issues de la recherche à tous les secteurs et à tous les paliers de personnel.

7. **Améliorer la gouvernance et le leadership en matière de recherche** en créant un système comprenant, notamment, un groupe de travail sur la recherche dans le cadre de la GIEPNE, dont la présidence relèvera du CCS, des leaders de la recherche associée aux objectifs de la GIEPNE et un coordonnateur général de la recherche entreprise dans le cadre de la GIEPNE.

Cette stratégie proposée ne détermine pas quelle sorte de recherche précise devrait être effectuée ou comment elle devrait l'être, mais elle est axée plutôt sur la façon dont la recherche entreprise dans le cadre de la GIEPNE devrait être organisée pour répondre aux besoins. Quant à savoir quels travaux de recherche particuliers devraient être entrepris, cela devrait s'inscrire dans chacune des stratégies se rapportant aux 29 autres objectifs de la GIEPNE.

On recommande que les intervenants de la GIEPNE discutent de l'analyse raisonnée et des idées présentées dans ce document, car il est nécessaire d'arriver à une entente collective sur les

éléments de la stratégie proposée qui sont à retenir. À cette fin, on voudra peut-être organiser un atelier spécial des intervenants, pour préciser, à partir du présent document, les résultats, la stratégie et les mesures à associer à l'objectif de la GIEPNE dont il est ici question. Dans la poursuite de cet objectif, la réussite dépendra entièrement des ressources qui pourront être affectées à chacun des sept volets de la stratégie et aux activités en découlant. L'atelier pourrait aussi chercher à déterminer où et comment ces ressources peuvent être mobilisées.

1. INTRODUCTION

The Eastern Scotian Shelf Integrated Management (ESSIM) Initiative, which commenced in 1998, is a collaborative management and planning process facilitated by the Oceans and Coastal Management Division, Fisheries and Oceans Canada (DFO), Maritimes Region. It is concerned with the design and implementation of a multi-stakeholder integrated management and planning process for the Eastern Scotian shelf area, and is part of a Canada-wide program aimed at implementing the *Oceans Act*. A description of the complete ESSIM initiative is contained in a draft plan which is shortly to be finalized for implementation (ESSIM Planning Office 2005).

The draft ESSIM Plan contains 30 proposed objectives, which are intended to improve specific aspects of governance, social, economic and ecological conditions in the ESSIM planning area. Achievement of the social, economic and ecological ESSIM objectives will be highly dependent on the effectiveness by which the plan's governance objectives are implemented. More specifically, the governance objective, "**natural and social science research is responsive to knowledge needs,**" can be highlighted as a priority objective for ESSIM because of the key role which knowledge plays in decision-making. Without knowledge, gained through appropriate investigation, it will not be possible for stakeholders to effectively evaluate and assess the degree to which the plan's social, economic and ecological outcomes have been attained.

The objective of this document is to present some of the strategic considerations that apply to the long-term goal of ensuring that research is responsive to the knowledge needs of ESSIM stakeholders. This is done by:

- Considering what the objective should intend to achieve, and what the envisaged outcomes could be;
- Providing a preliminary overview of some of the knowledge needs that research and investigation activities need to address;
- Evaluating the existing capabilities and strategic status of ESSIM by means of a SWOT analysis;
- Proposing an overall strategy with initiatives, and activities, that can be considered for implementation in order to successfully achieve the outcomes of this objective; and
- Making recommendations for follow up.

As research and knowledge is pervasive to all aspects of the ESSIM Plan, there will be common strategic considerations in this document that will be useful in the development of strategies for other ESSIM objectives.

The intention is that this document should serve as an extension of ESSIM Plan implementation concepts, some of which have been introduced in the draft ESSIM Plan (ESSIM Planning Office 2005). The material will however require further debate and discussion by ESSIM stakeholders.

Once agreement has been reached concerning which elements of the proposed strategy should be pursued, the next step will be to develop an action plan for their implementation.

2. WHAT NEEDS TO BE ACHIEVED BY THIS OBJECTIVE?

In seeking the most appropriate strategy for each of the ESSIM objectives, it is important for stakeholders to have as clear a picture as possible about their envisaged outcomes. In developing such a picture for the objective "**natural and social science research is responsive to knowledge needs,**" it is relevant to examine and understand the terms "research" and "knowledge," and their potentially important role in supporting integrated oceans management.

Definitions of these two terms from several sources (Table 1), lead to the interpretation that this ESSIM objective is concerned with ensuring that defined investigations are carried out because stakeholders seek to increase their understanding of specific management questions. Furthermore, the information which is generated from these studies should be presented in an appropriate form that is able to be understood and used by the stakeholder community in the forming of opinions. Research and information transfer (involving knowledge management) are key activities which form the basis of developing a stakeholder community that is fully informed and knowledgeable about the key social, economic and ecological aspects pertaining to the ESSIM area, as well as the interrelationships between them. The eventual end outcome is an improved level of debate and interaction between stakeholders, and better decision-making on ESSIM-area issues.

Table 1: Examples of Definitions of the Terms "Research" and "Knowledge".

Source Dictionary	Definitions of Research	Definitions of Knowledge
Merriam Webster	Studious inquiry or examination - investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws.	The fact or condition of knowing something with familiarity gained through experience or association. Acquaintance with or understanding of a science, art, or technique.
Cambridge Advanced Learners	A detailed study of a subject, especially in order to discover (new) information or reach a (new) understanding.	Understanding of or information about a subject which has been obtained by experience or study, and which is either in a person's mind, or possessed by people generally.

Source Dictionary	Definitions of Research	Definitions of Knowledge
MSN Encarta	Methodical investigation into a subject in order to discover facts, to establish or revise a theory.	General awareness or possession of information, facts, ideas, truths, or principles. Clear awareness or explicit information of a situation or fact.

This objective should thus be concerned with developing an approach which allows for the design and implementation of activities (e.g., pure and applied research, monitoring, evaluation, information management, reporting, networking, training etc.) that generate and transfer information that is relevant to the knowledge needs associated with achieving each of the ESSIM Plan objectives. Whilst the process of research is highlighted as the activity in this objective, the main outcome is to ensure that knowledge needs are fulfilled. Researchers cannot be expected to be responsive unless knowledge needs have been identified, and, therefore, the starting point for relevant ESSIM research will be about defining the knowledge needs for each objective, and then how these can, or should, be fulfilled through research and investigation.

There are many examples of research programs that have contributed to fulfilling the knowledge needs of multiple stakeholders involved in the management and use of natural resources - e.g. ecosystem management in South Africa (Huntley 1987); integrated land use management in Australia (Land and Water Australia 2005); integrated watershed and lake management in Canada and USA (Great Lakes Commission 2006); and a multiplicity of natural resource management issues in the European Union (European Environmental Agency 2006). Closer to home, programs such as those developed by the Gulf of Maine Council on the Marine Environment (http://www.gulfofmaine.org/) and Bay of Fundy Ecosystem Partnership (BoFEP - Wells et al. 2005) offer good examples of ongoing multi-stakeholder programs which ESSIM can take note of. All of these cited programs have common factors that have contributed to their relative successes. Some of the main ones include:

- Identified priority issues, which are recognized, as such, because they cause adverse and observable social, economic or ecological impacts;
- A societal and political desire to contain and/or improve the situation because benefits can be seen;
- A critical mass of researchers with idea generators and research leadership;
- Realistic and defined objectives with a time schedule;
- Appropriate participatory input by stakeholders;
- Multiple funding sources which support activities and allow for progressive and incremental research to take place;

- Good management, coordination and communication with a well-executed information transfer system;

- Appropriate program infrastructure e.g., administration and facilities; and

- A well-developed evaluation system which evaluates research activities and products in terms of their relevance to improving integrated management.

Based on the above, it is possible to propose outcome statements which represent a picture of what needs to be achieved through implementation of this ESSIM objective. The proposed outcome statements for this objective could include:

- **ESSIM knowledge needs are continually being identified and announced** - mainly through definition of outcomes, identification of knowledge gaps that lead to agreement on the parameters that quantitatively and qualitatively describe the intended outcomes for all of the ESSIM Plan objectives;

- **An interactive interdisciplinary network of research and monitoring personnel is in place**, which has the capability of responding effectively to meeting all of the ongoing multiple knowledge requirements of ESSIM stakeholders;

- **Adequate research resources have been mobilized** (finances, facilities and technologies) to support appropriate research, measurement, monitoring and assessment of progress in meeting the ESSIM Plan objectives;

- **Information from research is readily available and is effectively communicated** to the respective ESSIM stakeholder sectors so as to develop collective knowledge and understanding; and

- **An ESSIM research management and coordination system is in place** to deal with leadership, administration, planning, coordination, evaluation, funding etc.

3. WHAT ARE THE KNOWLEDGE NEEDS OF ESSIM?

One of the main outcomes of a multi-stakeholder integrated management initiative such as ESSIM is to ensure that all of its stakeholders have a good level of understanding about the issues and status related to each of the objectives in the ESSIM Plan. The large number of objectives dictates that there will be an even greater number, and a wide variety, of knowledge needs which have to be catered for.

A perspective of the general overall knowledge needs of ESSIM stakeholders can be obtained by posing key questions that can be associated with understanding of the objectives and how they relate to improved management of ESSIM area resources. Such an approach has been used elsewhere (e.g., see Gulf of Maine Council on the Marine Environment – http://www.gulfofmaine.org/summit/DraftIndicatorsFactSheet.pdf) where it has contributed to a better understanding of marine resources and their management. Such questions also serve to highlight what aspects researchers should be working on, and what they should be delivering.

It is therefore felt that it might be useful in this document to provide examples of the types of questions that ESSIM stakeholders might wish to have answered in order to improve their knowledge of each of the objectives (examples given in Annex 1). This approach requires some provisos, notably: the questions in Annex 1 are based on the wording of the draft ESSIM objectives as of July 7th 2006, which may change before the ESSIM Plan is finally approved; and, they are not exhaustive or complete, but are presented only to serve as examples of how knowledge needs can be defined as questions which require research (investigation/evaluation), and/or monitoring, and/or reporting activities.

The initial collective of questions (Annex 1) provides an insight into the wide dimensions of knowledge needs associated with the ESSIM Plan, and the enormous challenge that it will place on the capabilities of the research sector. It is stressed that:

- The questions, as posed in Annex 1, are only intended to provide starter material examples that need to be further developed and processed. Debate and discussion should be seen as a next step to further extend and refine these.

- The approach can be useful in the development and refinement of strategies for achieving each of the ESSIM Plan objectives.

- Although it is likely that there is already considerable knowledge on each of these questions, the approach serves to demonstrate the need for there to be a continuous process of assessment concerning the level of understanding about issues relating to meeting the ESSIM Plan objectives.

- The questions also provide useful material for evaluation of progress and performance of the ESSIM Plan; and

- There will be a need for prioritization of activities as it is unlikely that all aspects can be covered simultaneously.

4. WHAT IS THE SITUATION REGARDING ESSIM'S RESEARCH CAPABILITIES?

In light of the dimensions of envisaged knowledge needs, the key question arises "*Does the current ESSIM system have the capacity and capability of fulfilling the knowledge needs of its stakeholders?* Answers to this question will to a large extent provide an indication of what the overall strategy should be for ensuring that the objective is met.

For the purposes of this document, it was decided to undertake a quick, but useful strategic exercise which is based on the identification by stakeholders of strengths, weaknesses, opportunities and threats (SWOT analysis) of an organization. It provides an approach to identify gaps between where an organizational entity (ESSIM) is currently positioned, against where it needs to be in the future (see www.marketingteacher.com). A conventional SWOT analysis of ESSIM was therefore carried out by interviewing a range of ESSIM stakeholders and persons involved in research and knowledge management (see list in acknowledgements). They have contributed by providing a collection of comments and opinions on ESSIM and its capabilities for ensuring that research is able to respond to knowledge needs.

It is recommended that SWOT analyses should capture the main issues that are of concern to stakeholders without going into great explanation and detail (www.marketingteacher.com). The ESSIM SWOT issues, identified through the process of consultation, are encapsulated in short sentences presented below (not in any order of priority) and indicate that there are numerous positive and negative aspects which require consideration for the development of any strategy. It is emphasized that this list of issues represents what has emerged though one-on one discussions and represent only a preliminary consultation process. It would be unprofitable, and beyond the scope of this document, to attempt to substantiate them, but rather to use them in proposing a strategy. Ideally such issues should be identified and developed through an open process (interactive workshop) in which stakeholders collectively agree that the statements do indeed represent the main SWOT issues for ESSIM. There is thus still a need for ESSIM stakeholders to comment on, and add to, the identified issues.

Strengths of the ESSIM Initiative's Current Research Capabilities

- The ESSIM area is a well-studied ocean area with relatively good background information.
- There are numerous ongoing monitoring and research activities.
- There are several local institutions participating in ESSIM-relevant research (government, academic, NGO, commercial).
- There is a reasonable pool of potential researchers that are locally available.
- Some research needs have already been defined for focused projects (e.g., Gully MPA, commercial species, and coral conservation).

- There are institutions (e.g., The Bedford Institute of Oceanography, Dalhousie University etc.) that have lots of experience in institutional marine research.

- There is a positive attitude and good external image of the ESSIM Planning Office.

- There are already some knowledge communication networks and mechanisms in place (e.g., publications, websites, ESSIM Forum, ACZISC, OMRN, SAC, RCOM, ACAP, PON).

- There are already some partnership research initiatives in place, or under development (e.g., Offshore Energy and Environmental Research Association (OEER).[1]

Weaknesses of the ESSIM Initiative's Current Research Capabilities

- ESSIM and research is given low priority in most of the stakeholder (all sectors) business activities.

- There is currently a low capacity for coordination of research.

- There is no observable integrated research process in place.

- Research priorities and needs have not been defined.

- Research and monitoring capabilities have not been mobilized.

- ESSIM has not captured the interest of researchers.

- There is no visible and active ESSIM research network.

- There is little interdisciplinary research and a low level of involvement of social and economic research.

- There is no visible research leadership.

- There are no identifiable ESSIM research projects.

- There is a confusing picture of ecosystem objectives and how this will be realistically applied to ESSIM research.

- There is a low level of awareness about existing research products and their potential application or relevance to ESSIM.

- There are no high profile champions at the decision-making or political level.

[1] Bruce Cameron, Nova Scotia Department of Energy, pers. comm., mentioned the development of the OEER and its intended activities.

- There are no defined ESSIM funding opportunities with an open procurement system.
- There is a DFO-centred dominance of the philosophy and agenda of ESSIM research.
- There is an absence of formalized ESSIM management questions to which researchers can respond.
- There is an unclear picture of how data and information will be handled.
- There is no effective knowledge communication system.

Opportunities that will Promote and Support Research

- The Oceans Act and its Action Plan which both express federal policy to support ocean management and scientific research.
- There are many global and national political imperatives which seek to achieve sustainable development.
- There is a need for demonstrable implementation of ecosystem objectives.
- There is a need for solutions to the continued demise of fishery stocks.
- There is a need to develop and improve international interaction on ocean management.
- There is a large and diverse group of stakeholders that have multiple knowledge requirements.
- There are many international projects and case studies that are relevant.
- Research and information transfer are processes that develop human resource capacity for integrated oceans management.
- There are many potential multiple sponsors of research.
- ESSIM has gained recognition as Canada's leading ICOM initiative.
- There is a high potential for partnership and collaborative projects.
- Stakeholders have already identified their potential knowledge needs through the collective agreement of 30 ESSIM Plan objectives.

Threats Which Might Hinder Research Activities

- The ESSIM Plan is over-ambitious with a large number of objectives that might thwart agreement on priorities for resource allocation.
- The offshore focus of ESSIM does not cater for the inclusion of more relevant and more immediate stakeholder integrated inshore and coastal management issues.
- The availability of researcher skills, particularly as there is an ageing researcher profile with many experienced personnel retiring.
- There are numerous other federal priorities which require attention.
- Other competing coastal and ocean initiatives in the Atlantic Canada region.
- There is a disconnect between the Ottawa top-down and the local bottom-up approach to governance.
- The large size of the ESSIM area and the protracted expectation that it will be extended.
- The large number of ESSIM stakeholders with their diverse and sectoral knowledge needs.
- Institutional competition for research funding.
- The lengthy timescale associated with ESSIM and lack of clear and visible implementation activities.
- Low, or lack of, resources will lead to perception that ESSIM research is not a priority.
- Lack of political leadership, and incomplete buy-in from institutions and senior decision-makers for the concept of integrated oceans management.
- Perception that research and knowledge will reveal information that leads to economic losses to the commercial sector.
- Lack of understanding amongst many stakeholders about their required mandates and responsibilities associated with implementation of the Oceans Act through ESSIM.
- Continued complexity and confusion as to how ecosystem objectives will provide the best rationale for ESSIM resource management.

The perspectives given by the consulted ESSIM stakeholders indicate a system in which there are currently many opportunities that are available to be pursued, and a relatively strong available research base and background on which to build. There are however, numerous organizational behaviour gaps (structural, organizational and attitudinal) which will have to be

addressed in order for research activities to achieve success in fulfilling knowledge needs of the ESSIM Plan. Because research is a pervasive facet of all of the ESSIM objectives, many of these SWOT issues will also apply to other objectives, as well as to the overall ESSIM initiative.

5. A STRATEGY FOR FULFILLING ESSIM'S KNOWLEDGE NEEDS

The SWOT analysis has identified that the current ESSIM system has deficiencies in many of the success factors that make up a mature and vibrant research and information transfer program. Consequently, in order to achieve the proposed outcomes of this ESSIM objective, the strategy should aim to put in place a suitable governance system which oversees ESSIM research and knowledge processes. Because this objective deals with the organization of research activities, as well as the transfer of knowledge, it has strong links with the other ESSIM governance objectives (e.g., collaborative structures, monitoring and reporting, evaluation, and communication). Components of the strategy should also link with, and contribute, to these.

Some proposed outcome statements were presented in section 2 of this document. These are reiterated below as the strategy should be aimed at the achievement of these outcomes.

- **ESSIM knowledge needs are continually being identified and announced** – mainly through identification of outcomes, knowledge gaps and definition of the parameters that quantitatively and qualitatively describe the intended outcomes for all of the ESSIM Plan objectives;

- **An interactive interdisciplinary network of research and monitoring personnel is in place**, which has the capability of responding effectively to meeting all of the ongoing multiple knowledge requirements of ESSIM stakeholders;

- **Adequate research resources have been mobilized** (finances, facilities and technologies) to support appropriate research, measurement, monitoring and assessment of progress in meeting the ESSIM Plan objectives;

- **Information from research is readily available and is effectively communicated** to the respective ESSIM stakeholder sectors so as to develop collective knowledge and understanding; and

- **An ESSIM research management system is in place** to deal with leadership, administration, planning, coordination, evaluation, funding etc.

To maximise strengths and counteract the current perceived weaknesses of ESSIM, it is felt that there are *seven* key areas where strategy for this objective could focus. The proposed overall strategy is schematically presented in Figure 1. It should be accepted that:

- Many of these areas (and activities) are not new to ESSIM, but successful achievement of this objective will require a higher level of effort and activity than previous;

- The focus areas and the associated actions are presented as ideas. There may be other approaches, and alternative or additional actions. They require debate and discussion;

- The successful achievement of the objective will probably require for there to be activity in all of the areas – the level of success will be related to the level of activity; and

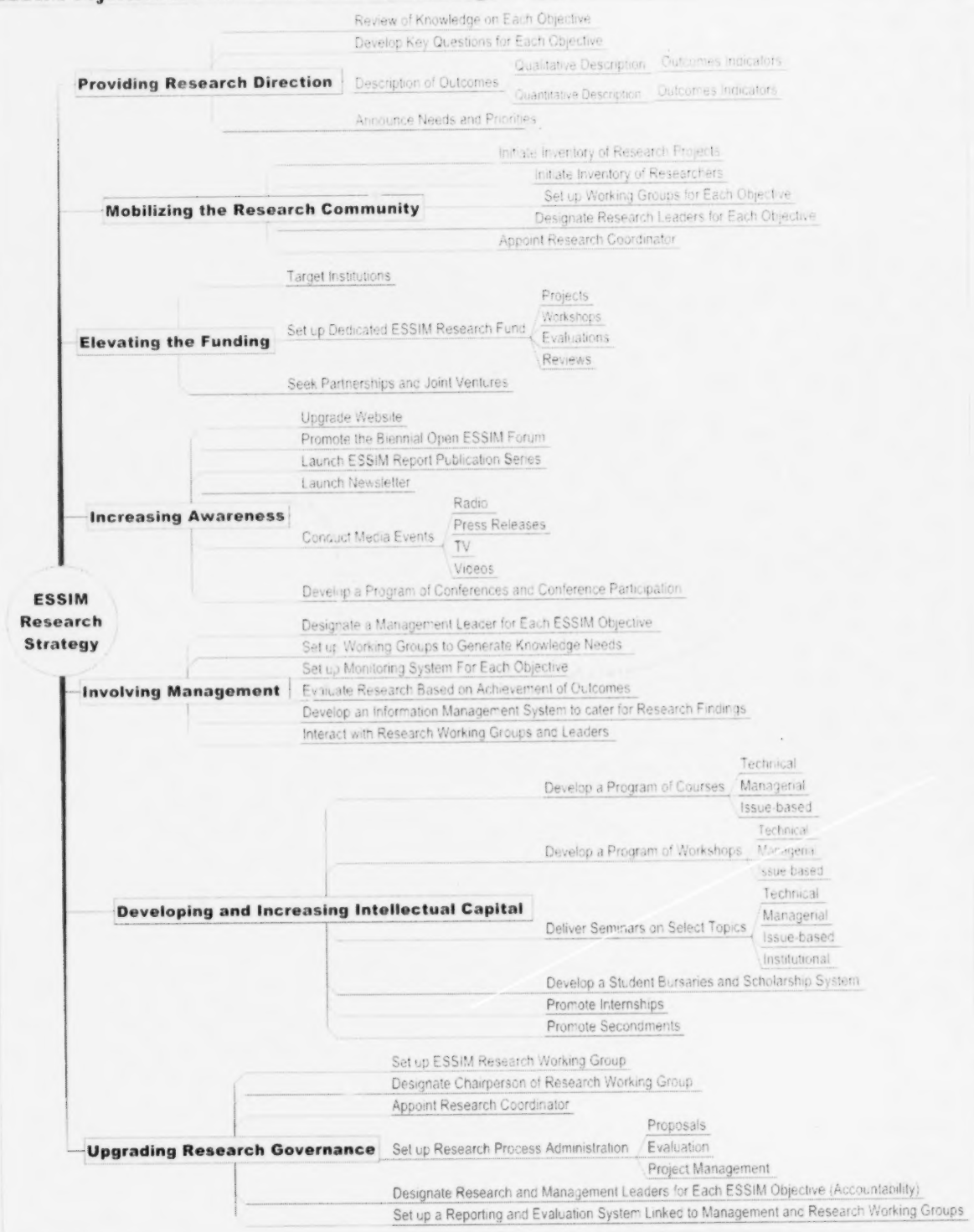
- Figure 1 should be viewed as a strategic framework for this objective from which operational objectives and targets can be made – and performance measures put in place.

5.1 Providing Direction to Researchers

One of the key facets of program success is that of providing researchers with as clear a picture as possible of needs and opportunities that should be encouraged. The ESSIM initiative must therefore strive to provide a clear direction to the research that is required. There are several aspects that need to be addressed by this key area – developing operational outcomes, defining knowledge needs, describing outcomes, development of research approaches, setting of priorities, and the announcing of knowledge needs.

The knowledge needs for ESSIM can, to a large extent, be derived from the statements that define each of the 30 objectives in the draft Plan. However, each one of these objectives still needs to be further elaborated on in order to provide stakeholders and researchers with a clearer picture of what the eventual outcomes are. Many of the objectives are still in what can be termed a conceptual form, as it is not possible to immediately identify any tangible or quantifiable outcomes for them. This is particularly relevant to the human use and ecological objectives (see Walmsley 2005; O'Boyle and Jamieson 2006).

Figure 1.—Schematic diagram of proposed elements for an overall strategy to achieve ESSIM objective for research to fulfill knowledge needs.



It is felt that the provision of research direction for ESSIM is best undertaken from three fronts: (1) by attempting to better define the knowledge needs; (2) by prioritizing what stakeholders and researchers should focus on; and (3) by announcing these needs and priorities to researchers. Accordingly the following activities should be considered.

Defining Operational Outcomes for Each Objective. For each of the 30 ESSIM objectives it is essential that operational outcomes should be developed and agreed on. These will provide a clearer picture of what the end point will be for each objective. For some of the objectives it will possibly be necessary for some form of investigation (research) to be done in order to define operational objectives. Some examples of operational outcomes for this current objective have been suggested in this document. The work of Walmsley (2005) on outcomes and outcomes indicators for the objectives of an earlier version of the ESSIM Plan needs to be revisited.

Reviewing the status of Outcomes Indicators. Once operational outcomes have been agreed on it will be necessary to agree on indicators that describe the level of achievement of these outcomes for each of the ESSIM objectives. These can be either qualitative or quantitative, and will form the basis of all monitoring and reporting. Some will already be monitored, whereas others will require development (and testing) of methodology, or the setting up of an appropriate monitoring procedure.

The review activity should be aimed at establishing the status of information on all outcomes indicators with the eventual objective of having an agreed, and official, set of ESSIM outcome indicators. It should not be seen as a one-off procedure which results in an instant and complete set of indicators. It will probably take many years for this to be achieved. Progress can then be assessed by the sets of indicators (for each objective) that are agreed on as providing a complete and acceptable description of the end operational outcomes. Although this aspect forms part of the ESSIM monitoring and reporting strategy, it is highlighted here because it also forms an important part of setting direction for researchers who will need to be involved in conceptualising, developing, testing, monitoring and reporting on many of these outcome indicators (for each of the objectives).

Assessing the status of knowledge for each objective and identifying gaps. There is an enormous amount of information that is available for each of the ESSIM objectives. Unfortunately, much of this information has not yet been processed into an ESSIM-relevant form as related to the ESSIM Plan objectives with their intended operational outcomes. For all objectives, there should be a review of the status of information on all objectives (as from the date of approval of the ESSIM Plan) to identify knowledge gaps that need to be addressed (which can be either science-related or management-related depending on the aspect that is of concern).

Posing Knowledge Questions for Managers and Researchers. Many of the ESSIM objectives and their knowledge needs are best articulated through the use of questions to which investigators can respond. Therefore, it might be useful for both decision-makers and researchers to develop a set of key questions that relate to each of the ESSIM objectives and their operational outcomes (examples are given in Annex 1). These questions can be continuously updated to provide researchers with knowledge needs to which they can respond.

Prioritizing Objectives and Research Activities. Because of the many objectives and knowledge needs, there will be a need to prioritize. For a multi-stakeholder program such as ESSIM, there will be many priorities, all of which relate to the differing needs and perspectives of the respective stakeholders. It is felt that prioritization will be best achieved by requesting relevant ESSIM stakeholder organizations to formally declare which objectives (and their associated research questions and outcomes) they are currently supporting, or are willing to support and promote in terms of investing their own resources (personnel, time and finances). This approach will identify priorities, based on the criterion that the issue is important enough for stakeholders to commit their own resources. The ones for which there are no potential sponsors or supporters amongst the stakeholders are therefore ones which can be considered to be of low priority, and which perhaps need reconsideration within the ESSIM Plan. This process will also identify those ESSIM stakeholders and the extent of their support in the implementation the overall plan.

Announcing Knowledge Needs. Assessment of whether researchers are responsive to ESSIM's knowledge needs can only be done if researchers have been formally alerted to these needs by ESSIM. Therefore it is important that the ESSIM governance system provide its research community with formal announcements of knowledge needs that they should respond to. It is advocated that ESSIM produce regular formal announcements of knowledge needs that the research community can react on. These announcements should be viewed as identifying opportunities for researchers to respond to when developing research plans, and applying for funding within their own institutions or from external funding agencies.

5.2 Mobilizing the Research Force

It is essential that ESSIM develop and nurture its own research network which can focus on meeting ESSIM's knowledge needs. However, the development of program research communities can only be successful if the individual researchers (and institutions) see opportunity for benefit to be obtained. Such benefits include, amongst others: potential research funding, opportunities for networking, career advancement, learning, and promotion of own or team work, etc. Some of the actions which could be considered include:

Identification and Characterization of the Research Network. This could be achieved by requesting researchers and investigators to put forward short statements to ESSIM regarding their previous, current and future activities, and capabilities to undertake investigations and activities, which contribute to the generation of knowledge, as related to each of the ESSIM objectives. This process will contribute to characterizing the network of active researchers who are available, or could become involved, in implementing the plan. It will also serve to identify which objectives have active research/monitoring activities associated with them. Returns from researchers can be used to develop an inventory of ESSIM-active researchers and projects that can be included in many ongoing research, evaluation and communication activities.

Once an initial inventory of research capabilities and activities is in place, there will be a need for the inventory to be updated to keep a record of ongoing research activities, their progress and the findings which are relevant to the emerging ESSIM program.

Development of Research Groups for Each ESSIM Objective (or Group of Objectives). Each of the ESSIM objectives will require multidisciplinary intellectual input, meaning that more than one researcher (and institution) will have to be involved. It is advocated that ESSIM promote the development of formal or informal working groups (networks) that provide focus on the knowledge needs, and the required research response, for each objective (or linked groups of objectives. It might also be desirable to designate research leaders for each of these networks, but this should be left to the dynamics (and choices) of the particular groups.

Designating an ESSIM Research Coordinator. The mobilization of the research community and its interaction with ESSIM will require a higher level of administration, networking and communication activities. There will be a need to ensure that ESSIM is seen as the entity which is committed to driving these processes. The designation of a research coordinator, charged with the task of implementing all research and knowledge management activities (administration, networking and knowledge management) is considered to be an essential part of, and key component, of the strategy, if it is implemented.

5.3 Elevating the Funding

The extent to which knowledge needs are fulfilled will be highly dependent on the funding resources that are able to be directed towards answering the many questions that need to be answered. For a multi-stakeholder initiative such as ESSIM, it would be impractical, if not impossible, to attempt to create a single funding source for all research and monitoring. There are however three main approaches that can be advocated as a means to ensure that the initiative receives funding to support research, monitoring and information transfer.

- The first is to ensure that the ESSIM initiative gains increasing prominence and influence amongst decision-makers and in institutions and organizations that can allocate resources to support ESSIM-relevant activities. This includes all ESSIM stakeholder organizations (e.g., DFO, Environment Canada, Government of Nova Scotia, and WWF) as well as other national and international funding agencies (e.g., NSERC, NRC, SSHRC, the UN, World Bank, Ford Foundation, Rockefeller Foundation, etc.). Notice of ESSIM and its knowledge needs should be circulated and publicized as widely as possible. The effort could also be enhanced through an awareness campaign aimed at high level decision-makers.

- The second is to ensure that ESSIM itself receives, and administers, funding that can be used for specific key investigations and projects. The types of projects covered by this funding should primarily depend on how well they cover collective knowledge requirements of stakeholders and priorities that have been identified. This funding, provided by the federal government (and hence providing a signal of commitment to implement the Oceans Act), and possibly augmented by other sponsors, could be administered through the ESSIM Planning Office, and overseen by SAC. It should be used to initiate and support projects which the SAC feel should be undertaken because they are critical to ESSIM in terms of creating knowledge that advances the initiative. The funding should be run on an open and competitive basis – i.e. support proposals and activities that are undertaken by government, academic, NGO, and/or consultant parties.

- A third could be the establishment of joint initiative and partnership funding for activities that serve multiple stakeholder interests, and which require more than one source of funding. The ESSIM Planning Office could be instrumental in facilitating/brokering such activities which might require specific agreements (MoUs) for implementation.

5.4 Increasing Awareness of ESSIM and its Knowledge Needs

There is a large body of evidence to indicate that many individuals (particularly decision-makers) in ESSIM stakeholder organizations are not fully aware of ESSIM, its objectives, and what benefits (tangible and non-tangible) can be expected through participation. This is particularly the case for knowledge needs and associated research activities. There is therefore a strong need for ESSIM to develop a system which raises the level of awareness on knowledge needs and the benefits that can be derived by investing in research activities. ESSIM should adopt a multitude of activities, all of which contribute to transferring knowledge to all stakeholder sectors, as well as the public. There will have to be regular updating and transfer of appropriate information to stakeholders. This will allow for stakeholders to be kept up to date on research activities and how they are contributing to providing answers to sustainable development issues in the ESSIM area. Some of the main activities that need to be addressed are:

- Using regular open meetings that serve as information exchange sessions to explain the ESSIM plan and its progress. The ESSIM open Forum, which is a biennial event, is an example of this.

- Developing and promoting the activities of the specialist groups that are linked to ESSIM objectives – particularly to focus on the transfer of knowledge on specific issues that are important to stakeholders (e.g., noise, invasives, loss of employment, and wealth creation, etc.).

- Securing a higher level of involvement of executive decision-makers in ESSIM activities. Targeted persons and institutions could be invited to play motivational leadership roles in ESSIM research events.

- Convening of regular conferences and workshops that focus on specific issues. This could be done through collaboration/partnership between ESSIM stakeholders.

- The production of documents that highlight how research and its findings are contributing to answering management problems.

- The production of a regular report which informs parties about ESSIM and its progress, including how new knowledge has furthered this. This would best be effected through a biennial state of ESSIM report which is advocated as a way to ensure open and transparent evaluation of ESSIM (Walmsley 2006).

- The production of promotional material (newsletter, fliers, information sheets) on select research aspects of ESSIM.

- Use of the internet (website) to disseminate information and news on ESSIM.

5.5 Linking Managers and Researchers

There is a need to develop a strong linkage between managers and researchers. This could possibly be best achieved through working group interaction via the development of knowledge questions, outcomes, outcomes indicators, and evaluation of monitoring results. The identification of outcomes and outcomes indicators is a critical and complex process (see also section 5.1). It is critical because it defines how stakeholders will see and measure the eventual outcomes of the ESSIM Plan. It is complex because all quantitative outcome indicators will require some form of technical verification and, many might have to be developed and researched specifically to cater for the ESSIM area and the objective of concern. Most indicator development programs have been unsuccessful because management has tended to leave indicator development to the researchers - without accepting ownership and responsibility for the indicators that are going to be used in the formulation of opinions and decision-making. It is considered important that the ESSIM strategy for this objective should strive to ensure that the development and use of outcomes indicators is driven by decision-makers, who are going to use them in monitoring and evaluation of the Plan.

The process of indicator selection (and testing) will require inputs from both researchers (e.g., methodologies, data availability, and monitoring, etc.) and decision-makers (e.g., does the indicator satisfy knowledge and decision-making needs?).

Each objective will require a set of formal indicators that provide a qualitative and quantitative picture of the outcome that is desired. It is essential that these indicators are developed and agreed on by ESSIM stakeholders as they will be used for monitoring, reporting and assessing progress in implementation of the plan. A process for identifying and securing agreement on the outcome indicators for each objective will need to be developed and implemented. This could include the establishment of indicators working groups for each objective (involving both managers and researchers) associated with the previously-mentioned research working groups. The process could also involve an indicators ratification system via ESSIM's stakeholder Advisory Council (SAC) or the proposed ESSIM research working group (see section 5.7).

Once agreement on outcome indicators has been formalized there will be a need to set up a monitoring and information system which is able to collect and process data and information on each of the agreed outcome indicators associated with each objective. This aspect ties in with the objectives on monitoring and reporting, and information management and communication.

5.6 Developing and Increasing Intellectual Capacity

The ESSIM Plan will take decades of activity in order to achieve its objectives. As the ESSIM Plan unfolds (and new knowledge is developed), there will be continuous need for ongoing education and training of stakeholder institutions (at all levels of personnel). It is therefore important that ESSIM promote and support education and training activities that develop and maintain intellectual capacity. These could include, amongst others:

- Develop and deliver training courses and workshops on issues relevant to ESSIM's objectives, specifically using ESSIM as the case experience. This could include both in-house (for specific institutions and sectors) and general courses open to all stakeholders;

- Develop and deliver training courses and workshops on research methods for assessing and monitoring outcomes;

- Produce guideline and best practice documents for use by trainers in academic institutions and promote train-the-trainers activities:

- Promote the involvement of interns and students on ESSIM-related projects within stakeholder institutions;

- Promote the practice of secondment between institutions; and

- Sponsor students and researchers to work on ESSIM research issues through the provision of bursaries and scholarships from ESSIM funding.

5.7 Upgrading Coordination and Leadership

For an initiative such as ESSIM there is a need for there to be a suitable form of leadership that can both guide and evaluate research that is taking place. This could be accomplished in numerous ways, some of which include:

- The creation of an interdisciplinary working group, operating through SAC, which champions and promotes research and its response to knowledge needs. It could also oversee the implementation of this strategy. A possible concept for this group and its operations is included in Annex 2;

- The appointment of an ESSIM research working group chairperson with the responsibility of leading the working group, and reporting to SAC. The chairperson could ideally be a senior researcher from one of the stakeholder institutions;

- The involvement of a full-time research coordinator from within the ESSIM Planning Office, with the responsibility of operationally administrating, coordinating and promoting the overall ESSIM research program. The tasks of the coordinator could be directed by the ESSIM research working group (see also section 5.2);

- Designating research leaders for each of the ESSIM objectives (or groups of them), with the responsibility for promoting and carrying out relevant activities. These persons could also be part of the interdisciplinary research working group (see also section 5.2);

- The creation and operation of a wider science network that is specific for ESSIM and which creates a suitable structure and modus operandi by which researchers can continually interact, be queried, and respond to knowledge needs as and when they arise. There is the potential that this forum could be operated in collaboration with existing network organizations (e.g., OMRN and Atlantic Coastal Zone Information Steering Committee); and

- By convening meetings and workshops that evaluate how research activities have progressed towards meeting the ESSIM outcomes, and publishing the findings as ESSIM reports.

6. CONCLUSIONS AND RECOMMENDATIONS

This document has attempted to develop ideas for a strategy to ensure that research will be responsive to the knowledge needs of ESSIM stakeholders. The following conclusions and recommendations are made:

1. This objective should be concerned with developing an approach which allows for the design and implementation of activities that generate and transfer information (e.g., pure and applied research, monitoring, information management, reporting, networking, and training, etc.) that is relevant to the knowledge needs associated with achieving each of the ESSIM Plan objectives. The eventual end outcome is to have a stakeholder community that is fully informed and knowledgeable about the key social, economic and ecological aspects pertaining to the ESSIM area, as well as the interrelationships between them.

2. It is possible to propose outcome statements which represent a picture of what needs to be achieved through implementation of this ESSIM objective. The proposed outcome statements for this objective could include:
   a. ESSIM knowledge needs are continually being identified and announced.
   b. An interactive interdisciplinary network of research and monitoring personnel is in place.
   c. Adequate research resources have been mobilized.
   d. Information from research is readily available and is effectively communicated.
   e. An ESSIM research management system is in place.

3. The knowledge needs of the ESSIM Plan are extremely diverse, but it is essential for there to be a process in place which continually reviews the Plan and provides researchers with questions to which they can respond. This document has attempted to generate examples of such questions for each of the 30 ESSIM objectives (see Annex 1).

4. A SWOT analysis of the ESSIM system's current capabilities for meeting stakeholder knowledge needs reveals that ESSIM possibly does have the capability, but not the capacity to respond to all of them. There are many factors which make this so – mostly related to stakeholder attitudes and the organizational system for supporting oceans research in Canada. There are numerous strengths within the ESSIM stakeholder community and opportunities that, if capitalized on, can be used to create a valuable and responsive research system.

5. It is felt that there are *seven* key areas where strategy for this objective might focus. These are:
   1. Developing and providing direction to researchers
   2. Mobilizing the research force
   3. Elevating the funding
   4. Increasing awareness of ESSIM
   5. Linking managers and researchers
   6. Developing and increasing the intellectual capacity
   7. Upgrading research governance and leadership

6. It is recommended that ESSIM stakeholders discuss and debate the rationale and ideas presented in this document. There is a need to secure agreement on what elements of the proposed strategy should be pursued. This could possibly be achieved by convening a focused stakeholder workshop which, using this document as starter material, has the purpose of agreeing on outcomes, strategy and actions for this ESSIM objective. Success in achieving the objective will depend entirely on the resources that are able to be allocated to each of the proposed seven areas and their activities. The workshop could also attempt to identify where such resources can be mobilized.

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ANNEX 1: Examples of Key Knowledge Questions for each of the 30 ESSIM Plan Objectives

1. ***Collaborative structures and processes with adequate capacity, accessible to community members are established***

- What collaborative models are best-suited for integrated management of multi-user ocean resources at the same scale as ESSIM, and where are they being applied?
- What are the key processes that promote integrated management in the ESSIM area?
- What are the capacity gaps that require attention?
- Are all stakeholders involved in the ESSIM process, and to what extent?
- Are stakeholders happy with the collaborative structures?
- Are the collaborative structures performing their functions effectively?

2. ***Appropriate legislation, policies, plans, and programs are in place***

- What legislation is applicable to the ESSIM Plan?
- What relevant programs are in place and what programs are missing?
- What plans are relevant and applicable to the ESSIM area, and which plans need to be developed?
- What policies, or lack thereof, can be linked to poor resource management or conflict in the ESSIM area?
- Are there any legislative omissions?

3. ***Legal obligations and commitments fulfilled***

- What are the legal obligations that need to be fulfilled?
- What are the commitments that need to be fulfilled?
- Who are the parties that need to ensure that their obligations and commitments are fulfilled?

4. ***Ocean users and regulators are compliant and accountable***

- Which ocean users and regulators need to be compliant and accountable?

- What are the specifications for the achievement of compliance and accountability?
- Which ocean users and regulators are not complying to agreed specifications?

5. ***Ocean stewardship and best practices are implemented***

- What is ocean stewardship and how can it be measured?
- What codes of conduct apply in the ESSIM area?
- What best management practices are being applied in the ESSIM area?
- What best management practices are needed in the ESSIM area?

6. ***Multi-sectoral resource use conflict is reduced***

- What are the main categories of multi-sectoral conflict and what is their historical record of occurrence?
- Which stakeholders are involved in creating conflict?
- Which multi-sectoral conflicts have been resolved through ESSIM?
- Which multi-sectoral conflicts remain unresolved, and for how long?
- Which conflicts should ESSIM be dealing with?

7. ***Natural and social science research is responsive to knowledge needs***

- What are the knowledge needs of the ESSIM stakeholders, and are stakeholders articulating their knowledge needs?
- Does the ESSIM system have the capacity and capability of being responsive to knowledge needs?
- Have researchers been requested to develop appropriate plans and strategies for research on each of the objectives - and have they responded?
- Have researchers and decision-makers identified suitable, and measurable, outcome indicators for each of the ESSIM objectives?
- What research is being carried out at the specific request of ESSIM?
- How quickly does the ESSIM research community respond to formal requests for knowledge?

- What research/monitoring activities can be linked to ESSIM objectives?

- Are stakeholders happy with the capabilities, responsiveness and quality of the ESSIM research network?

8. ***Information management and communication are effective***

- What information is currently being requested by ESSIM stakeholders, how is it accessed and how is it used?

- Are stakeholders satisfied with the availability of information and the delivery methods of information transfer?

- What is the current level of stakeholder awareness of ESSIM and its activities?

9. ***Monitoring and reporting are effective and timely***

- Has the ESSIM coordinating structure agreed on an official set of outcome indicators that should be monitored for each of the ESSIM objectives?

- Which of the official outcome indicators are being monitored?

- What should be reported on, to whom, when, and how frequently?

10. ***Communities are sustainable***

- What are the quantitative and qualitative specifications for a sustainable community and what is the relationship to ESSIM?

- Which communities are unsustainable?

- What should be monitored in order to assess the level of sustainability of a community?

11. ***Sustainable ocean community relationships are promoted and facilitated?***

- What is a sustainable ocean community?

- What aspects of community relationships should be promoted and facilitated?

12. ***Ocean area is safe, healthy and secure***

- What are the main factors that contribute to an unsafe, unhealthy and insecure ESSIM ocean area?

- What are the health, safety and security standards for the ESSIM area?

- What are the social, economic and ecological losses that occur as a result of unsafe, unhealthy, and insecure practices?

- Who is responsible for ensuring a safe, healthy and secure area?

13. Wealth is generated sustainably from renewable ocean resources

- What constitutes sustainable wealth from renewable ocean resources and what is its status?

- What is the wealth that is generated from ESSIM renewable ocean resources?

- What elements of wealth creation from ocean resources are unsustainable?

14. Wealth is generated sustainably from non-renewable ocean resources

- What constitutes sustainable wealth from non-renewable ocean resources and what is its status?

- What is the wealth that is generated from ESSIM non-renewable ocean resources?

- What elements of wealth creation from non-renewable ocean resources are unsustainable?

15. Wealth is generated sustainably from ocean infrastructure

- What is the infrastructure that contributes to wealth in the ESSIM area?

- What infrastructure is unsustainable?

16. Wealth is generated sustainably from ocean-related activities

- What ocean-related activities generate wealth?

- Which of these ocean-related activities are unsustainable and why?

17. Diversity of benthic, demersal and pelagic community types is conserved.

- Which are the key communities that require diversity conservation

- How has diversity changed over time?

- What are the factors that have caused any changes to diversity over time and can these be quantified?

18. Incidental mortality of all species is within acceptable levels

- What is the current level of incidental mortality and which species are most affected?
- Are there best practice guidelines and standards for incidental mortality?
- What are the acceptable levels of incidental mortality?

19. At risk species protected and/or recovered

- What at-risk species (and their dimensions – numbers, colonies, populations etc.) require protection in the ESSIM area?
- What factors threaten the survival of these at-risk species, and which of these can be managed?
- Can the level of protection or recovery be quantified?

20. Invasive species introductions are prevented and distribution is reduced

- What is the current level of invasiveness (species, numbers and distribution) in the ESSIM area?
- Which invasive species are of most concern?
- To what level must invasiveness be reduced?

21. Genetic integrity (i.e., genetic fitness and diversity) is conserved

- What is the trend in genetic integrity?
- What genetic integrity needs to be conserved?

22. Primary and secondary productivity are healthy

- What aspects of primary and secondary productivity should be measured?
- What are the current levels of primary and secondary productivity?
- What are the levels of primary and secondary productivity that constitute a healthy environment?
- What factors affect primary and secondary productivity, and which of these can be managed?

23. Trophic structure is healthy

- What constitutes a healthy trophic structure in the ESSIM area?
- What levels of the trophic structure are defective/deficient?
- What methods can be used to improve the trophic structure?

24. Biomass and productivity of commercially harvested and other species are healthy

- What are the levels of species biomass and productivity that constitute a healthy ecosystem?
- Which species are of concern in terms of an "unhealthy" level of biomass and productivity?
- What are the factors that influence biomass and productivity health, and which of these can be managed?

25. Physical characteristics of ocean bottom and water column support resident biota

- What are the key physical characteristics that contribute to the support of resident biota?
- In which sections of the ESSIM area are the physical conditions unsuitable?
- Can the adverse physical conditions be managed and improved?

26. Harmful noise levels are reduced to protect resident and migratory species and populations

- What are the noise levels which would be considered to be harmful to ocean species?
- Which species are most susceptible to the impacts of noise?
- What are the current noise levels in the ESSIM area, and where are these considered to be harmful to resident and migratory species?

27. Wastes and debris are reduced

- What are the sources and levels of waste and debris in the ESSIM area?
- What quantifiable impacts does waste and debris have on the ecosystem?
- How can these sources be reduced?

28. ***Chemical characteristics of ocean bottom and water column support resident biota***

- What are the key chemical characteristics that contribute to support of resident biota?
- In which sections of the ESSIM area are the chemical conditions unsuitable?
- Can the adverse chemical conditions be managed and improved?

29. ***Overall atmospheric pollution from ocean activities is reduced***

- What are the sources and levels of atmospheric pollution from ocean activities?
- What are the levels to which atmospheric pollution should be reduced?

30. ***Habitat integrity is conserved***

- What is habitat integrity, how is it measured, and what aspects should be conserved?
- What habitats require conservation in the ESSIM area and why?

ANNEX 2: A Proposed Operating Concept for an ESSIM Research Working Group

This concept further develops ideas on how an envisaged research working group might be structured and operated within the framework of the ESSIM Plan. It requires debate and discussion by ESSIM stakeholders with the objective of:

1. Agreeing that a research working group is a good coordinating mechanism for ESSIM Plan implementation; and if so then
2. Developing and finalizing a terms of reference.

Purpose:

The purpose of the ESSIM Research Working Group is to provide an inclusive, multi-disciplinary expert review, advisory, and validation mechanism for research and technical aspects of the ESSIM Plan and its implementation.

Roles and Responsibilities:

The working group should form part of the collaborative structures that support the overall coordination and implementation of the ESSIM Plan by:

- Reporting to ESSIM through the Stakeholder Advisory Council (SAC);
- Developing a strategy for the ESSIM Plan objective that deals with research (- *natural and social science research is responsive to knowledge needs*);
- Making recommendations to SAC on research priorities and how these can be carried out;
- Developing and coordinating research and knowledge transfer approaches which respond to the knowledge needs of ESSIM stakeholders. This could include the overseeing of activities related to envisaged ESSIM networking; and
- Providing an evaluation mechanism, where and when applicable, for ESSIM-related research proposals, products and activities;

Membership:

The working group should be made up of persons who have had wide experience in research program management and are representative of relevant disciplines (social, economic and natural sciences). Sectoral and disciplinary diversity within the working group is desirable, but sectoral representation should not be a criterion for membership. Optimal group size is considered to be approximately 8-10 members to allow the group to achieve diversity of perspective, and operate effectively and efficiently. Membership, in the first instance, should cover a fixed period (e.g. 2 years), but should be continually reviewed in order to introduce new perspectives, address emerging needs, or replace members who are unable to continue serving. Membership should not

be based on having alternates for members, but additional parties can be co-opted to attend meetings, if and when required. Such attendance would be cleared by the chairperson

Possible initial membership could be:

- A Chairperson or Coordinator appointed by SAC, and who reports to ESSIM through SAC;
- At least one social science specialist;
- At least one economic science specialist;
- Three natural science specialists persons involving academic, NGO and government sectors, at least one of whom should be from the DFO senior science management structure;
- An ex-officio ESSIM Planning Office representative to implement and follow up operational recommendations of the Working Group; and
- Secretary and meeting organiser provided by ESSIM Planning Office.

Selection:

A broadcast invitation should be sent out calling for nominations from interested persons and institutions. If there is an absence of nominees from a particularly relevant discipline, the ESSIM Planning Office may have to engage in targeted solicitation. Selection of members should be done by the SAC who will also determine the final membership composition. Selection could be based on the following criteria, amongst others:

- Experience in interdisciplinary research programs
- Diversity of research perspectives
- Record of impartiality and absence of any vested interest
- Experience in knowledge management and information transfer
- Experience in managing and motivating researchers
- Status in the ocean resource management community

Meetings:

Meetings of the working group should be formally scheduled on a regular basis (e.g. quarterly) Meetings will be called by the chairperson and organized through the ESSIM Planning Office who will provide secretarial and administrative support.

Decisions:

The group should not be a decision-making body, but rather one that process and generates ideas on research and its application to ESSIM. Although consensus within the group as to technical or scientific advice may be desirable, it is not essential for the group to reach consensus on all matters. Recommendations or advice from the working group will be taken to other bodies, such as the Stakeholder Advisory Council, for consideration. Where there are a variety of views within the working group on a given topic, the diversity of perspectives will be taken forward to the relevant body or bodies to consider.